

CLAIMS

We Claim:

- 1 1. A method to determine a position of a stage, comprising:
2 capturing images of a plurality of targets located on the stage;
3 comparing the captured images of the plurality of targets with stored
4 images to determine displacement coordinates for each target; and,
5 translating the displacement coordinates for the targets into position
6 coordinates for the stage.

- 1 2. A method as in claim 1 wherein capturing images includes:
2 illuminating the plurality of targets.

- 1 3. A method as in claim 1 wherein the plurality of targets includes three
2 targets.

- 1 4. A method as in claim 1 wherein the capture of the images is performed
2 by a plurality of sensors, one sensor for each target.

- 1 5. A method as in claim 1 wherein comparison of the captured images of
2 the plurality of targets with the stored images is performed by imaging chips
3 within a plurality of sensors, one sensor for each target.

1 6. A method as in claim 1 wherein there are two displacement
2 coordinates for each target.

1 7. A method as in claim 1 wherein there are six position coordinates for
2 the stage.

1 8. A method as in claim 1 wherein the targets are placed at oblique angles
2 to all surfaces of the stage.

1 9. A method as in claim 1:
2 wherein each target is placed so a target plane for each target is at an
3 oblique angle to all surfaces of the stage;
4 wherein the capture of the images is performed by a plurality of sensors;
5 and,
6 wherein for each target, a sensor from the plurality of sensors is aligned
7 nominally perpendicular to the target plane.

1 10. A method as in claim 1 wherein there are six position coordinates for
2 the stage, the six position coordinates being:
3 translational movement along a first axis;
4 translational movement along a second axis;
5 translational movement along a third axis;
6 rotational movement about the first axis;

7 rotational movement about the second axis; and,
8 rotational movement about the third axis.

1 11. A system to determine a position of a stage, comprising:
2 capturing hardware that captures an image for each of a plurality of
3 targets located on the stage; and,
4 processing software that compares the captured images of the plurality of
5 targets with stored images to determine displacement coordinates for each of
6 the plurality of targets and translates the displacement coordinates for the
7 targets into position coordinates for the stage.

1 12. A system as in claim 11 wherein the capturing hardware includes a
2 plurality of light sources that illuminate each of the plurality of targets.

1 13. A system as in claim 11 wherein the plurality of targets includes three
2 targets.

1 14. A system as in claim 11 wherein the capturing hardware is located in
2 a plurality of sensors, one sensor for each target.

1 15. A system as in claim 11 wherein there are two displacement
2 coordinates for each target.

1 16. A system as in claim 11 wherein there are six position coordinates for
2 the stage.

1 17. A system as in claim 11 wherein the position coordinates for the stage
2 are absolute coordinates from a reference location.

1 18. A system as in claim 11 wherein there are six position coordinates for
2 the stage, the six position coordinates being:

3 translational movement along a first axis;
4 translational movement along a second axis;
5 translational movement along a third axis;
6 rotational movement about the first axis;
7 rotational movement about the second axis; and,
8 rotational movement about the third axis.

1 19. A system to determine a position of a stage, comprising:
2 capturing means for capturing an image for each of a plurality of targets
3 located on the stage; and,
4 processing means for comparing the captured images of the plurality of
5 targets with stored images to determine displacement coordinates for each of
6 the plurality of targets and translating the displacement coordinates for the
7 targets into position coordinates for the stage.

- 1 20. A system as in claim 19 wherein there are six position coordinates for
2 the stage, the six position coordinates being:
- 3 translational movement along a first axis;
4 translational movement along a second axis;
5 translational movement along a third axis;
6 rotational movement about the first axis;
7 rotational movement about the second axis; and,
8 rotational movement about the third axis.